

**BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA**



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*Order Instituting Rulemaking Regarding
Broadband Infrastructure Deployment and
to Support Service Providers in the State
of California*

Rulemaking 20-09-001
(Filed 10/12/20)

**OPENING COMMENTS OF ELECTRONIC FRONTIER FOUNDATION TO ORDER
INSTITUTING RULEMAKING REGARDING BROADBAND INFRASTRUCTURE
DEPLOYMENT AND TO SUPPORT SERVICE PROVIDERS IN THE STATE OF
CALIFORNIA**

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I. Introduction

In accordance with Rule 6.2 of the California Public Utilities Commission (“Commission”) Rules of Practice and Procedure (“Rules”), the Electronic Frontier Foundation (EFF) submits comments to the Order Instituting Rulemaking 20-09-001 (“Rulemaking”).

II. About EFF

The Electronic Frontier Foundation (EFF) is the leading nonprofit organization defending civil liberties in the digital world. Founded in 1990, EFF champions user privacy, free expression, and innovation through impact litigation, policy analysis, grassroots activism, and technology development. With over 30,000 dues-paying members (with several thousand California members) and well over 1 million followers on social networks, we focus on promoting policies that benefit both creators and users of technology. EFF has been at the forefront of studying the

future of broadband access in the high-speed market and has conducted in-depth research and produced both legal and technical publications on the issue. EFF's goal in broadband access is the deployment of universally available, affordable, and competitive high-speed networks. EFF focuses on fiber because it is the only data transmission medium capable of both low latency and speed upgrades for generations to come that far exceed alternative last-mile options as well as a necessary component for ubiquitous 5G coverage.

III. The Commission is right to focus on fiber optics as it is the universal ingredient in all high-speed access networks

Fiber is a vastly superior data transmission medium among last-mile connections, and extending its reach to all Californians should be the core goal of any California Broadband Plan if we want to avoid past mistakes that have led to the digital divide and systematic underserving of low-income and rural communities. EFF's engineering research about the various last-mile options has led the organization to conclusively find that fiber, and specifically fiber-to-the-home (FTTH), dominates all alternatives in terms of potential future capacity, i.e., cheap growth.¹ It is the only fixed broadband connection that has an economically and technically feasible path towards a multi-gigabit broadband access future well past even the fastest speeds today. Indeed, scientists have been able to push 100 terabits per second down a single fiber² in laboratory conditions, indicating that real-world utilization has ample room for growth for decades to come. This is not true for 5G wireless broadband, DOCSIS cable systems, or the newest proposed satellite broadband systems. Each of these other systems must contend with concrete barriers to growth to match consumer demand that FTTH systems will never face.³

Knowing these differences is crucial to understand how best to chart out a broadband plan designed around meeting the future needs for the state's economic and societal needs. The issue is not only about the market today, but about the market tomorrow as demand for bandwidth

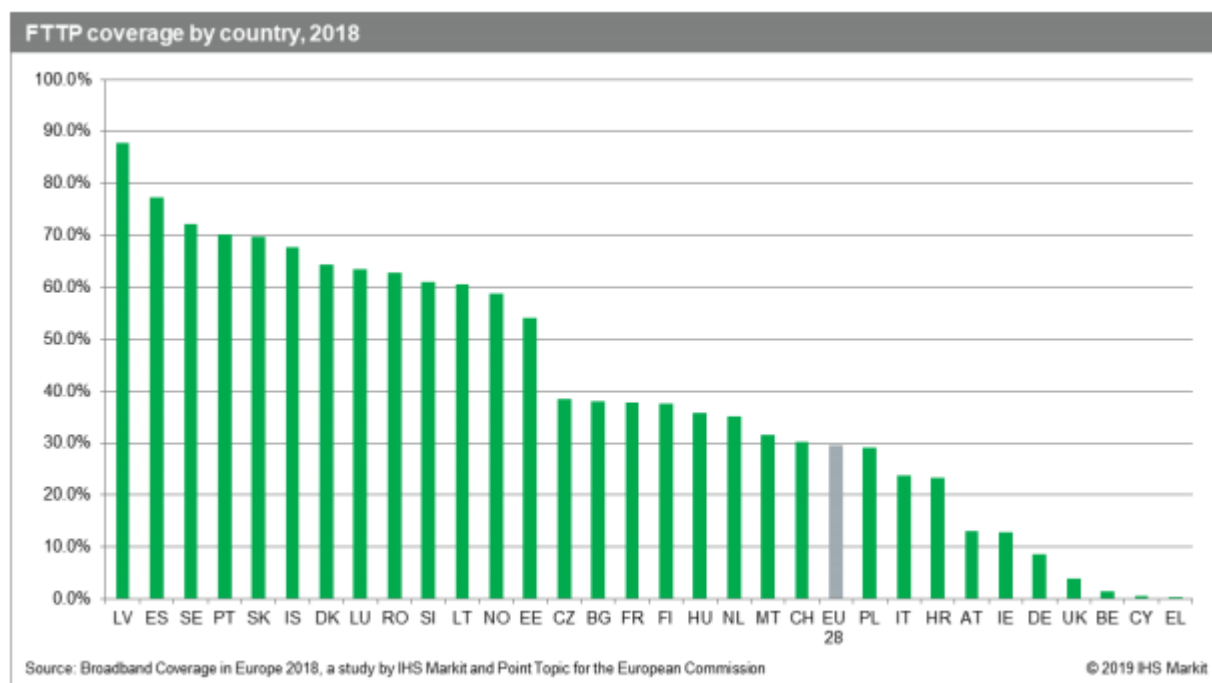
¹ Bennett Cyphers, *The Case for Fiber to the Home, Today: Why Fiber is a Superior Medium for 21st Century Broadband*, ELECTRONIC FRONTIER FOUNDATION (Oct 11, 2019), https://www.eff.org/files/2019/10/15/why_fiber_is_a_superior_medium_for_21st_century_broadband.pdf.

² *Id.* at 22

³ *Id.* at 21

continues to grow. Eventually today's high speed will become the bare minimum necessary years from now, and reliance on outdated metrics such as the FCC's definition of broadband access at 25/3 mbps as a type of ceiling for infrastructure planning effectively ignores the underlying foundational needs. California is absolutely right to go beyond the federal standard. A forward-thinking plan properly recognizes that legacy networks such as copper are approaching obsolescence while new but capacity-limited alternatives (such as satellite or 5G wireless) are both dependent on fiber and limited in long term usefulness. We should not pretend otherwise if the goal here is to ensure all Californians eventually enjoy *equal* access to the Internet.

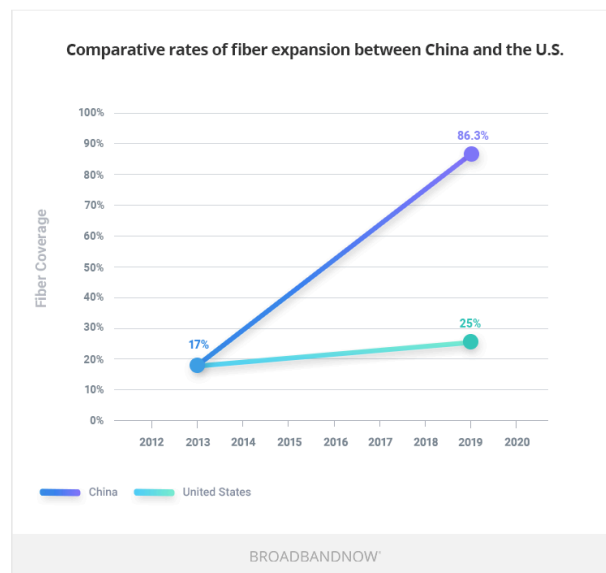
Fiber's importance for high-capacity access is already understood across the world. Today a majority of the EU nations have greater FTTH coverage than does California. Slovakia has now joined Portugal, Latvia, Lithuania, and Spain in achieving 70 percent FTTH coverage (more than double California). Another six EU members have reached 60 percent FTTH coverage and more are making progress towards universal deployment.



The dwindling minority of EU nations lagging on FTTH deployment are actively rethinking their telecom policy, much as California is doing now under Governor Newsom's Executive Order. Getting the state on the right path is necessary in order to maintain California's global

competitiveness given that we have much to catch up on. Getting this wrong means ceding our international competitiveness to the EU, South Korea, and most notably China.

A 2019 report⁴ estimated that China's fiber infrastructure program is on track to connect more than 1 billion households to fiber optics within a few more years. The country's "Belt and Road Initiative," which has been its global development infrastructure strategy, has allowed China to run laps around the U.S. telecom market not just on FTTH but on 5G as well.⁵ This is due to the convergence between FTTH and 5G that Chinese telecommunications companies intend to leverage. China Telecom has openly stated their plan to have both a universal fiber network with 5G deployment riding on top of the wires.⁶ The tragedy here is the United States was on par with China just 7 years ago (chart below), but the lack of policy emphasis on fiber infrastructure both at the state and federal level has resulted in the United States and California falling behind.



⁴ Tyler Cooper, *China's Fiber Broadband Internet Approaches Nationwide Coverage; United States Lags Several Behind*, BROADBANDNOW (Dec. 3, 2019), <https://broadbandnow.com/report/chinas-fiber-broadband-approaches-nationwide-coverage>.

⁵ Susan Crawford, *China Will Likely Corner the 5G Market – and the US Has No Plan*, Wired (Feb. 20, 2019), available at <https://www.wired.com/story/china-will-likely-corner-5g-market-us-no-plan>.

⁶ Alan J. Weissberger, *China Telecom to Accelerate 5G Deployment; 100% Fiber Network Coverage; Gigabit Fiber Broadband Deployment*, IEEE COMMUNICATIONS SOCIETY, (Mar. 19, 2019), available at <https://techblog.comsoc.org/2019/03/19/china-telecom-to-accelerate-5g-deployment-100-fiber-network-coverage-gigabit-fiber-broadband-deployment>.

With each passing year, California risks ceding leadership of the multi-gigabit era of broadband to other parts of the world, and that will carry major ramifications. Future innovations in applications and services that rely on multi-gigabit instantaneous transmission of data will find their home in countries where those networks are universally deployed and not here. California—the headquarters of Silicon Valley—should take this threat seriously, as it is clear that China intends to replace us as the next global center for Internet innovation.

IV. Infrastructure Deployment Models and Strategies

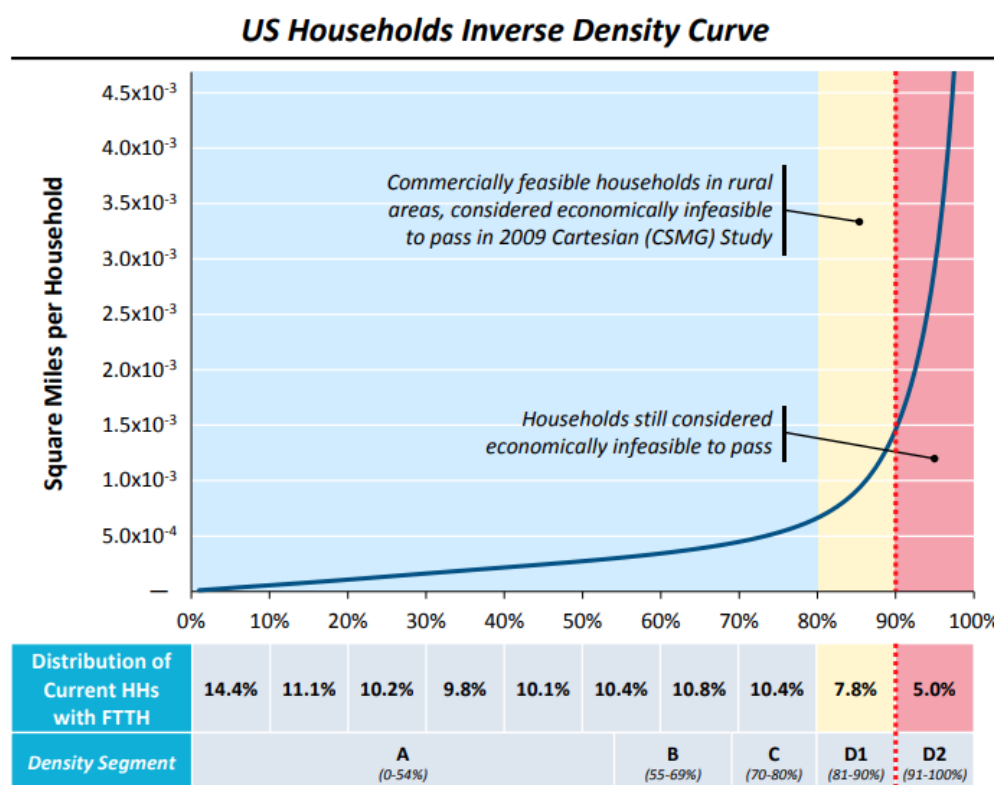
The existing duopoly of telephone and cable were independently built as monopolies, often aided by preferential financial instruments due to their monopoly status.⁷ However, the old 20th-century duopoly is fading as the cable industry has demonstrated its unique advantage in incrementally upgrading its systems to meet the broadband future. This advantage stems from luck, not foresight. Telephone networks were built with copper lines to service low-capacity voice communications. Cable systems were built with coaxial cable lines meant to transmit high-capacity video services as a means to extend broadcast signals. Today, the telephone system that delivers broadband via digital subscriber line (DSL) technology is reaching its hard limits as a broadband delivery system with speeds below 100 mbps. Meanwhile, cable systems have already deployed gigabit download speeds and can eventually reach 10 gigabit symmetrical speeds.⁸ In essence, the copper wires connecting homes are ill-suited for the future, while coaxial cable wires have proven resilient as they are hybridized with fiber optics.

Focusing on fiber deployment, where it is and is not, and what the government can do to facilitate new deployment models, is key to not just closing the digital divide but to ensure Californians have 21st-century ready access to the Internet. Given that new fiber networks will not enjoy monopoly status like their cable and telephone predecessors, promoting multiple different types of approaches suited for various communities will be necessary.

⁷ Susan Crawford, *Captive Audience: The Telecom Industry and Monopoly Power in the New Gilded Age*, 72, Yale University Press.

⁸ Press Release, National Cable and Telecommunications Association, Introducing 10G: The Next Great Leap for Broadband (Jan. 07, 2019).

Here is the good news: FTTH is already economically feasible in a *super-majority* of California's communities if the right policies and government efforts are in place to facilitate fiber deployment. A recent study⁹ by the Fiber Broadband Association found that FTTH is commercially feasible up to the 90th percentile of density (chart below). Even for the remaining 10 percent, we are seeing models led by the public sector and rural cooperatives on long-term capital investments as opposed to huge infusions of grant financing. For example, a rural cooperative in Missouri today can deliver gigabit service at \$100 a month at a population density of *2.4 people per square mile*.¹⁰



Source: Fiber Broadband Association Cartesian Study (2019)

⁹ Fiber Broadband Association, *New Study Finds All-Fiber Deployments to 90% of Households Achievable in Next Decade* (Sep. 10, 2019), available at <https://www.cartesian.com/fiber-broadband-association-new-study-finds-all-fiber-deployments-to-90-of-households-achievable-in-next-decade>.

¹⁰ Christopher Mitchell, *United Fiber Tackles Missouri's Most Rural-Community*, BROADBAND BIT PODCAST (Feb. 14, 2017), available at <https://muninetworks.org/content/united-fiber-tackles-missouris-most-rural-community-broadband-bits-podcast-240>.

Here is the bad news. Barely 30% of the California market is served with fiber and indications are major telecommunication providers are not only pulling back their investments,¹¹ but mounting evidence indicates that their investments in fiber have discriminated on the basis of income in major California cities resulting in disproportionate impact on communities of color.¹² For rural markets, one major ISP has neglected its investments into fiber so systemically in exchange for fast profits that it has resulted in one of the largest telecom bankruptcies in years impacting 2 million California residents.¹³

In short, the state of California is experiencing market failures in broadband deployment where profitable households are being ignored and systematic underinvestment is the preferred means of extracting profits. This is despite the near-total deregulation ILECs have argued for and have enjoyed from the Restoring Internet Freedom Order,¹⁴ despite billions in new revenues being freed up from the reduction in corporate taxes,¹⁵ and despite the FCC's copper retirement rules absolving them of sharing obligations if they transitioned over to fiber. At some point we have to assume Lucy is going to pull the football and chart a new course.

¹¹ Jon Brodtkin, *AT&T Kills DSL, Leaves Tens of Millions of Homes without Fiber Internet*, ARSTECHNICA (Oct. 5, 2020), available at <https://arstechnica.com/tech-policy/2020/10/life-in-atts-slow-lane-millions-left-without-fiber-as-company-kills-dsl>; See also Examination of the Local Telecommunications Networks and Related Policies and Practices of AT&T California and Frontier California (Apr. 2019), available at https://www.tellusventure.com/downloads/cpuc/quality/cpuc_network_examination_2010_2017_executive_summary_redacted_22jul2019.pdf.

¹² Vincent Le and Gissela Moya, *On the Wrong Side of the Digital Divide: Life Without Internet Access, and Why We Must Fix It in the Age of COVID-19*, THE GREENLINING INSTITUTE (June 2, 2020), <https://greenlining.org/publications/online-resources/2020/on-the-wrong-side-of-the-digital-divide>; Galperin, H., Bar, F., Kim, A.M., Le, T.V., Daum, K., *Who Gets Access to Fast Broadband? Evidence from Los Angeles County*, Spatial Analysis Lab at USC Price, Annenberg School for Communication (Sept. 2019), <http://arnicusc.org/wp-content/uploads/2019/10/Policy-Brief-4-final.pdf>.

¹³ Steve Blum, *California must take Frontier's bankruptcy as seriously as PG&E's*, Steve Blum's Blog (Apr. 15, 2020), available at <https://www.tellusventure.com/blog/california-must-take-frontiers-bankruptcy-as-seriously-as-pges>

¹⁴ See Restoring Internet Freedom Order, WC Docket No. 17-108, Declaratory Ruling, Report and Order, and Order, at 52.

¹⁵ Tax Cuts and Jobs Act of 2017, Pub. L. No. 115-97, 131 Stat. 2054; See also Ryan Knutson & Austen Hufford, *Verizon to Pay Down Debt, Given Employees Stock Awards with Tax Windfall*, WALL STREET JOURNAL (Jan. 23, 2018), available at <https://www.wsj.com/articles/verizon-dials-up-wireless-revenue-growth-1516714601> (reporting an extra \$ 4 billion of cash on hand for Verizon); see also Reuters & Fortune Editors, *AT&T Is the Latest Company to Report a Tax Reform Windfall*, FORTUNE, Feb. 1, 2018, available at <http://fortune.com/2018/02/01/att-earnings-tax-reform> (reporting an extra \$3 billion of cash on hand from Congress cutting corporate taxes); <https://potsandpansbyccg.com/2020/10/05/a-huge-fcc-giveaway/>

The cure for these failures is to shift away where possible from large publicly traded national providers who are tethered to 3-to-5-year return on investment formulas that are incompatible with the long-term investment needs of the state. Given that cable networks cannot match the future potential of FTTH, given that universally available high-speed 5G broadband depends on universally available dense-fiber networks,¹⁶ and given that no major ISPs are committed to transitioning their entire network to fiber today, the CPUC must begin exploring ways to remedy these shortfalls through regulation, promoting alternative models, and rigorous support of local private and public options.

a. Implementing E.O. N-73-20, OP #8. What business models could the California energy Investor-Owned Utilities (IOUs) employ to make their existing and future fiber infrastructure more available in rural, urban, and Tribal areas? What are the critical requirements and incentives for these models to be effective?

Fiber's flexibility and capacity for multiple shared uses without congestion problems creates a lot of opportunities for shared uses. Fiber infrastructure supports more than just wireline broadband, allowing it to be an infrastructure that can attract multiple revenue sources. For example, fiber infrastructure supports 5G high-speed wireless, low-earth-orbit satellite data networks, electrical grid communications, transportation monitoring, cloud computing, public safety, distance education, telehealth, real-time applications, earthquake detection, and ISP competition. The key is promoting the sharing of the infrastructure for multiple uses.

Tremendous opportunity exists in synergizing electric utilities and private or public telecom providers, which can yield benefits to both parties. This is because electric utilities have access to rights-of-way necessary to deploy a fiber network, capacity to provide engineering support, and familiarity with long-term infrastructure deployment efforts. Furthermore, energy utilities already need to service their electrical needs with fiber optics, which means the infrastructure will go underutilized if not opened to multiple uses that attract revenue—like broadband.

¹⁶ Wireless Infrastructure Association, *Fiber: Inextricably Linked with 5G Connectivity*, WIA Blog (Aug. 19, 2020), available at <https://wia.org/blog/fiber-inextricably-linked-with-5g-connectivity>.

Alabama exemplifies such a joint venture. Its state legislature passed a law clarifying that electric utilities could leverage their easements and private rights-of-way to enable telecommunications services over their fiber assets.¹⁷ As a result, Mississippi-based C Spire and Alabama Power have jointly invested and begun sharing fiber infrastructure to mutually support the needs of both electricity and telecommunications. Homes in Birmingham, Shelby County, and other parts of the state will now obtain FTTH from C Spire. Such partnership would not have happened without policy from the state government to promote efficient infrastructure sharing.

The C Spire/Alabama Power model operates on the premise that C Spire is granted exclusivity in exchange for gaining access to the utility's fiber network in order to justify C Spire's costs in updating the fiber lines to serve telecommunications needs. The exclusivity gave C Spire the confidence that their investments in the utility's fiber network to make it broadband-ready could be recovered from newly connected customers, while Alabama Power was assured that C Spire would try to attract as many customers as possible to provide a stable and growing revenue base to the electric utility, resulting in lower rates. Through a revenue-sharing agreement, a telecom could dramatically save on their fiber deployment costs by paying an electric utility for access to their fiber network, while the utility's fiber construction costs would be reduced by obtaining a new revenue stream.

In any joint venture model, the CPUC can encourage the merger of these interests but also promote competition through open-access policies—even with initial exclusivity arrangements. Specifically, exclusivity should be seen as a means to help the electric utility recover its construction costs for deploying fiber while reducing telecommunications providers' costs because they need not build a duplicative fiber network. The telecom provider will have reaped the initial benefit of exclusivity, the electric utility will have reduced the cost on ratepayers for financing the fiber, and end users will initially gain high-speed access and eventually competition when the exclusivity expires.

¹⁷ H.B. 400, 2019 Leg., Reg. Sess. (Al.), <https://legiscan.com/AL/bill/HB400/2019>.

In an open access regime, the electric utility would retain its role as the fiber infrastructure provider but offer access on nondiscriminatory terms based on the costs of maintaining the line and providing the electrical support. Each telecom provider that makes use of the utility's open access network would pay a small portion of the revenue they generate to the utility. As the cost of providing broadband over fiber continues to drop over the years, end users will receive the benefit of lower prices driven by competition.

b. What strategies, incentives or standards can improve open access in deploying fiber and wireless infrastructure to be utilized by multiple carriers, particularly in rural and Tribal areas? Specifically, how can communication providers better share their assets and build planning (e.g. points of presence, carrier hotels, trenches, conduit, towers, poles, etc.)?

Access to rights-of-way is a major part of the deployment challenge, while the absence of such rights can stall even the world's largest and powerful corporations.¹⁸ Access to fiber capacity can be viewed through the same lens as poles and attachment rights; obtaining access to capacity can allow for more private and public entry. Open access should be viewed in this context as an infrastructure policy as opposed to a broadband policy, for it ensures capacity is available for private and public broadband providers.

Utah is a leader in this space: more and more households are connected to an expanding open-access fiber network run by local cities called Utopia, where residents enjoy 11 private options for gigabit service.¹⁹ This type of approach to broadband infrastructure, where the government builds the wires and shares its capacity to broadband providers, holds tremendous promise. One study predicts a structurally separated network deployment could **connect rural homes to fiber without standard subsidies** and through long-term low-interest financing.²⁰

¹⁸ Jon Brodtkin, *Why AT&T Says it can Deny Google Fiber Access to its Poles in Austin*, ARS TECHNICA, (Dec. 16, 2013), available at <https://arstechnica.com/tech-policy/2013/12/why-att-says-it-can-deny-google-fiber-access-to-itspoles-in-austin>.

¹⁹ Utopia Fiber, Residential Pricing, <https://www.utopiafiber.com/residential-pricing> (last visited February 4, 2020).

²⁰ Benoit Felten & Thomas Langer, *Structurally Independent Broadband Infrastructure can Solve Perceived FTTH Coverage Issues*, DIFFRACTION ANALYSIS (Jun. 13, 2016), <https://www.diffractionanalysis.com/services/white-papers/2016/06/structural-remedies-solve-rural-broadband-issue>.

In the EU, open-access fiber has made tremendous progress in furthering the national policy goals of the EU's gigabit society. These new types of infrastructure efforts that aggregate broadband providers to share over the same fiber lines have proven successful in various markets.²¹ But the open-access fiber industry's entry into the EU market was brought about by changes in the European Electronic Communications Code designed around promoting their entry to assist in the effort to deploy national FTTH.²² Several international financial entities that have been directing money towards EU fiber projects²³ have recently entered the California market through Fullerton, California's²⁴ SiFi Network deployment, which is the largest private open-access fiber build in the United States. Attracting more of these dollars should be a state priority given the superior efficiencies open-access fiber has over traditional national telecom providers.

That the United States lacks a private financial system able to support long-term fiber investments for non-utilities with 30-year low-interest vehicles remains a barrier to enabling willing entities from building the infrastructure. The state should explore ways to either provide long-term financing to deploy open access fiber or enable local governments to access long-term low-interest bonds to mirror the Utopia debt financing model. With the right financing, even households in the upper 90th percentile of density averaging \$5,000 per home will only carry a debt service amount of \$13.88 plus interest per month while being connected with data infrastructure useful for multiple generations. Given that most consumers already pay well above

²¹ Ilsa Godlovitch & Tseven Gantumur, *The Role of Wholesale Only Models in Future Networks and Applications*, WIK-CONSULT, Mar. 23, 2018, available at https://www.stokab.se/Documents/Nyheter%20bilagor/The%20role%20of%20wholesale%20only_WIK.pdf

²² *Europe's wholesale-only and open access operators form new alliance to accelerate the rollout of fiber networks*, REYKJAVIK FIBRE NETWORK (last visited Feb. 3, 2019), <http://www.reykjavikfibrenetwork.is/news/europes-wholesale-only-and-open-access-operators-form-new-alliance-accelerate-rollout-fiber>.

²³ Infracapital and Macquarie Capital are examples of the type of entities regularly investing in fiber infrastructure in the EU, see *Infracapital and Nokia named preferred bidder for Polish Fibre Broadband Network* (Jun. 15, 2017), available at <https://www.infracapital.co.uk/Controls/Brochure/-/media/Literature/UK/Infracapital/Infracapital-and-Nokia-named-preferred-bidder-for-Polish-fibre-broadband-network.pdf>; see *Macquarie Capital to Acquire Fibre Broadband Network in Move to Create Spain's First Independent Wholesale Bitstream Operator* (Nov. 6, 2019), available at <https://www.macquarie.com/us/en/about/news/2019/maccap-to-acquire-fibre-broadband-network-in-move-to-create-spains-first-independent-wholesale-bitstream-operator.html>.

²⁴ SiFi Networks, *SiFi Networks: First Homes Connected to the USA's Largest Privately Funded Open Access FiberCity* (Jun. 23, 2020), available at <https://www.prnewswire.com/news-releases/sifi-networks-first-homes-connected-to-the-usas-largest-privately-funded-open-access-fibrecity-301081352.html> (SiFi's investments in Fullerton are primarily backed by UK- and EU-based financiers currently).

market rates for slow broadband service in order to obtain access, many homes in even the most difficult-to-serve rural markets would willingly pay the fee for the infrastructure and would likely have a lower overall monthly bill.

In terms of wireless infrastructure, the agency must recognize the interplay between fiber optics and advanced wireless services and, perhaps more importantly, the unquestionable limits of wireless services as a competitive pressure in the high-speed market. Simply put, 5G has not revolutionized last-mile fixed-broadband access. The wireless industry has finally acknowledged that high-speed 5G depends completely on the existence of fiber-optic wires in the ground.²⁵ In other words, high-speed 5G does not exist without fiber.

Knowing this reality, cable industry executives and investors are not only unworried²⁶ about 5G broadband as a competitive pressure. In fact, for them it is a business opportunity for them to sell their fiber capacity.²⁷ Not only can cable systems already beat any 5G wireless deployment in terms of high-speed potential by deploying more fiber into their systems, they can sell their excess capacity to 5G towers without losing their customers.

The advantages DOCSIS and its future iterations have over wireless alternatives makes competition at the fastest speeds unrealistic. Simply as a matter of physics and available spectrum within the wires, only FTTH can have both lower latency and higher speeds than cable systems that would force cable companies to invest to compete. 5G deployment will always depend on available spectrum, and 5G at higher speeds (which require higher frequencies) are more affected by environmental conditions that insulated coaxial hybrid/fiber wired systems can avoid.²⁸

²⁵ Wireless Infrastructure Association, *Fiber: Inextricably Linked with 5G Connectivity*, WIA Blog (Aug. 19, 2020), available at <https://wia.org/blog/fiber-inextricably-linked-with-5g-connectivity>.

²⁶ Alex Sherman, *5G broadband is an existential threat to the cable industry, but executives and investors aren't worried*, CNBC (Dec. 1, 2019), <https://www.cnbc.com/2019/12/01/5g-broadband-is-a-threat-to-cable-companies-but-execs-arent-worried.html>.

²⁷ Jeff Baumgartner, *Cable '10G' Field Trials on Tap for 2020*, LIGHT READING (Jan. 6, 2020), <https://www.lightreading.com/cable/10g/cable-10g-field-trials-on-tap-for-2020/d/d-id/756561>.

²⁸ Cyphers, *supra* note 2.

As the Federal Communications Commission itself has noted in the past, wireless broadband and wireline broadband are complementary services and nothing in the latest developments in wireless technology have indicated a fundamental change. International markets that have comparable national high-speed wireless deployment still have consistent growth in their FTTH deployments²⁹ because users are not substituting one for the other. California should keep its eye on the engineering realities of wireless and trends in already existing markets that have proven the theory of wireless substitution to be wrong. The physics at play is undeniable.

Lastly, 5G as a last-mile broadband product is not producing expected revenues either at home or in the advanced international market of South Korea, calling into question how viable it is as a fixed-broadband access service. In South Korea, despite extraordinarily rapid growth in 5G subscribers and the upfront cost of laying fiber already being resolved through sharing requirements,³⁰ Internet Service Providers (ISPs) are only able to achieve revenue-neutral status with their 5G broadband.³¹ This suggests that the future of 5G will not be in the broadband access market, but rather in other, future markets that will need the unique services 5G can provide that WiFi or LTE cannot. Here at home, Verizon's experimental deployment of 5G as a last-mile option and competitor to cable is a cautionary tale that should deter us from concluding that 5G can disrupt cable's dominance.³² The fact is, the 5G industry is still figuring out its own future. Expert analysis indicates 5G as a ubiquitously available product remains highly speculative and far into the future.³³

²⁹ EFF response to arguments that wireless broadband can substitute for wireline broadband, GN Docket No. 18-238 (Oct. 12, 2018), <https://ecfsapi.fcc.gov/file/101269873074/EFF-%20Wireline%20vs%20Wireless.pdf>.

³⁰ Joseph Waring, *KT Dissatisfied with Government 5G Fibre Plan*, Mobile World Live (Apr. 13, 2018), available at <https://www.mobileworldlive.com/featured-content/asia-home-banner/kt-dissatisfied-with-government-5g-fibre-plan>.

³¹ Mike Dano, *Inside the Hunt for New 5G Revenues (Hint: Forget Phones)*, LIGHT READING (Nov. 19, 2019), [https://www.lightreading.com/mobile/5g/inside-the-hunt-for-new-5g-revenues-\(hint-forget-phones\)/d/d-id/755769](https://www.lightreading.com/mobile/5g/inside-the-hunt-for-new-5g-revenues-(hint-forget-phones)/d/d-id/755769).

³² Jeff Baumgartner, *Verizon Faces 'Steep Climb' to Attain Attractive Return on 5G Home – Analyst*, LIGHT READING (Mar. 20, 2019), <https://www.lightreading.com/mobile/5g/verizon-faces-steep-climb-to-attain-attractive-return-on-5g-home---analyst-/d/d-id/750289>.

³³ *Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2017–2022 White Paper*, Cisco (Feb. 18, 2019), Trend 2, https://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/white-paper-c11-738429.html#_Toc953330 (Cisco predicting that 5G will only be available to 10 percent of the US market by 2022); see also Berkeley Lovelace Jr., *'There's zero chance that 5G is a ubiquitous technology' by 2021, analyst says*, CNBC (Apr. 23, 2019), <https://www.cnbc.com/2019/04/23/analyst-craig-moffett-sees-no-chance-of-5g-becoming-ubiquitous-by-2021.html> (Craig Moffett's predicts there is a "zero chance" 5G will be widely available by 2021).

c. How can the Commission use its licensing, permitting and CEQA responsibilities to further the goals of this OIR? Are there areas of the CEQA process which can be streamlined while still meeting the statutory requirements?

Nearly 60-80 percent of network deployment costs are tied to the local construction.³⁴ Studies estimate that with the appropriate mix of city planning, city infrastructure sharing policy, and efficient permitting, the initial investment costs for competitive entry can be lowered by as much as 30 percent.³⁵ Furthermore, micro-trenching could reduce costs tied to the local construction by as much as 50 percent as well as increase the speed the wires can be deployed.³⁶ EFF acknowledges that there are challenges and concerns with micro-trenching,³⁷ but the benefits of reducing the overall cost per household will ultimately increase the number of homes that can be privately served through a competitor without government funds.

Reducing delay in minimizing hurdles in obtaining access to the rights of way is essential for network constructions. The experiences of Google Fiber's interactions with various cities at the time of their expansion can provide valuable lessons. For example, Kansas City won the 1,100 city contest because of the local government's willingness to ensure work permits were reviewed within 5 days, access to existing city infrastructure was opened (including conduit, poles, and building space), GIS data of city-owned assets were provided to the company to assist in their deployment plan, and a single point of contact was created to handle the various departments the company would have to interact with to deploy.³⁸

³⁴ EUROPEAN COMMISSION, *Analysys Mason: Support for the Preparation of an Impact Assessment to Accompany an EU Initiative on Reducing the Costs of High-Speed Broadband Infrastructure Deployment* at 36, <http://ec.europa.eu/digital-agenda/en/news/support-preparation-impact-assessment-accompany-eu-initiative-reducing-costs-high-speed>; See also INTERNATIONAL TELECOMMUNICATION UNION, *Cost Analysis for Fiber to the Home*, <http://www.ictregulationtoolkit.org/en/toolkit/notes/PracticeNote/2974>.

³⁵ EUROPEAN COMMISSION, *Analysys Mason: Support for the Preparation of an Impact Assessment to Accompany an EU Initiative on Reducing the Costs of High-Speed Broadband Infrastructure Deployment*, 36; <http://ec.europa.eu/digital-agenda/en/news/support-preparation-impact-assessment-accompany-eu-initiative-reducing-costs-high-speed>.

³⁶ Crown Castle, *Expanding infrastructure in record time*, available at <https://www.crowncastle.com/innovation-spotlight/microtrenching>.

³⁷ Doug Dawson, *The Pros and Cons of Microtrenching* (Mar. 31, 2017), available at <https://potsandpansbyccg.com/2017/03/31/the-pros-and-cons-of-microtrenching>.

³⁸ Google Fiber Missouri, Development Agreement, <http://www.netcompetition.org/wp-content/uploads/Google-Kansas-Agreement1.pdf> (last accessed on Sep. 20, 2014).

While California does not have many examples of the local infrastructure being pro-actively prepared for fiber deployment. One example EFF found was Brentwood's city code policy mandating that new developments deed conduit back to the city ultimately leading to Sonic's entry with \$40 a month gigabit fiber Internet. And while Brentwood's original purpose behind its city code was to invite cable television competition, the vast network of conduit was equally suitable for fiber-optic broadband.³⁹

The more pre-planning for easing entry that local governments can put in place today, the better the prospects become to attract local private entry and ultimately less after the fact intervention is needed by the state's regulator to navigate crowded rights of way. While the CPUC's direct authority over municipal policy is limited, it can encourage local governments and inform them of best practices that have facilitated fiber entry as well as lead by example with its own rights-of-way regulations. Standardizing processes to be as expeditious as possible as well as providing guidance to encourage uniformity for new means of deployment such as micro-trenching can yield significant results.

V. Economic Vitality and Recovery Strategies

a. What requirements, if any, should the Commission impose on communications service providers and IOUs to facilitate the construction of fiber when restoring facilities after a disaster such as a fire?

Every provider is likely to choose fiber as the default for any new construction given its long-term usefulness and value as an asset. However, there is a danger that some service providers may attempt to cut corners by providing inferior services and thus enhance profits after a disaster. To prevent this, the government must maintain a floor for public safety obligations of providers. Such a baseline floor should require that identical or improved services are allowed to

³⁹ Brentwood City Council, *Resolution Approving and Authorizing the City Manager to Execute a Conduit and Fiber Lease Agreement with Sonic Telecom, LLC, Substantially Consistent with the Attached, to Provide Gigabit Internet Service Within the City of Brentwood* (May 13, 2014) at 1, available at http://brentwood.granicus.com/Viewer.php?view_id=36&clip_id=1846&meta_id=151754

be part of any restoration of service post disaster. This would ensure that communities at least maintain a status quo post disaster rather than a back slide in the aftermath.

b. How can the Commission partner with other state agencies to effectively address the infrastructure and affordability gap for communications services in California? How can the Commission assist in the implementation of E.O N073-20, OP #7?

The State of California has laid fiber-optic cable to support the communication needs of its roads, water systems, and other transit projects. The State spends several billion dollars yearly in building infrastructure⁴⁰ and potentially possesses significant fiber assets that can be leveraged to improve California's broadband future. How much exists, however, and whether it can be leased, shared, or repurposed for broadband services is unknown, which hurts the state. If any state-owned fiber assets are currently unused, municipal or private providers could lease access in order to improve their current networks or build new ones. Identifying the location of these assets and making them publicly available is a vital step.

The CPUC already has a broadband mapping process based on the collection of private industry data. EFF recommends the CPUC consider creating a similar process that collects comparable data from every public agency in California that has fiber assets and deploys fiber in its infrastructure. Such data can be collected and published through a GIS map to promote sharing and leasing opportunities. Retrospectively identifying existing assets will be challenging given that their original deployments were not designed around broadband access, but at a minimum a process going forward can be established to allow the collection and publication of this data.

c. How should the Commission address access to existing infrastructure for those communities where there is infrastructure going through a community but they are not served by it?

⁴⁰ California Legislative Analyst Office, THE 2019-2020 BUDGET, CALIFORNIA SPENDING PLAN, available at <https://lao.ca.gov/reports/2019/4083/spending-plan-2019.pdf>.

San Francisco has the most advanced network deployment in the state of California but many of its residents living in apartment buildings lived adjacent to the infrastructure but lacked access to it. What was happening in the city was cable providers and landlords were engaging into payola schemes⁴¹ preventing fiber providers from entering into some of the most lucrative corridors in the city. Landlords would simply exert their property right to prohibit entry of new providers to force their tenants into the cable monopoly who was paying the landlord a per tenant fee. High density buildings are extremely valuable to any broadband provider because they represent a high revenue stream for very little overall investment in infrastructure. The majority of the cost would be in connecting to the building itself, while tiny incremental costs are added per apartment in exchange for a potentially new customer.

San Francisco put an end to this practice in 2016 with the passage of the “Occupant’s Right to Choose Communications Services Provider” also known as Article 52. Since its passage, FTTH has been deployed to approximately 300 multi-tenant buildings⁴² and small private competitors that originally had access to no apartment buildings now reach 75 percent⁴³ of the city and growing. Given the proven success of Article 52, the CPUC should encourage and to the extent its authority allows institute a statewide policy that prevents landlords from restricting tenants’ rights to advanced telecommunications services.

Lastly, access to fiber capacity at competitive market rates can enable small wireless ISPs to assist their local communities’ broadband needs. Common Networks serving Alameda County’s low-income community⁴⁴ came into existence because it had access to competitive fiber in

⁴¹ Susan Crawford, *The New Payola: Deals Landlords Cut with Internet Providers*, WIRED (Jun. 27, 2016), <https://www.wired.com/2016/06/the-new-payola-deals-landlords-cut-with-internet-providers>

⁴² Comments of CALTEL to the Federal Communications Commission, *available at* <https://ecfsapi.fcc.gov/file/1082229652864/CALTEL%20Reply%20Comments%20%20GN%2017-142%20%208-22-17.pdf>.

⁴³ Letter from San Francisco ISP Monkey Brains to Speaker Pelosi in opposition to FCC efforts to preempt San Francisco, *available at* <https://www.eff.org/document/letter-monkey-brains-isp-speaker-pelosi>.

⁴⁴ Common Networks, *Common Networks Brings Discounted Internet to the Largest Low-Income Housing Community in Alameda County* (May 19, 2020), *available at* <https://www.prnewswire.com/news-releases/common-networks-brings-discounted-internet-to-largest-low-income-housing-community-in-alameda-county-301061867.html>.

Oakland. The story of Dillon Beach where a small town obtained high-speed access from a father paying AT&T to draw a fiber line into his garage to launch his own broadband company should inform our policy.⁴⁵ Both of these wireless options backed by fiber deliver speeds well in excess of the Governor's goal of 100 mbps. However, they only came into existence because they both discovered the location of the fiber line and had a willing seller for capacity. Facilitating this natural organic growth of broadband markets can be improved with publicly available data.

EFF recommends that the CPUC include fiber mapping as part of its broadband mapping efforts in order to inform potential local private and public partners of the location of fiber capacity. In an ideal scenario a local player can view the map and contact the provider that owns the nearest fiber and enter into an arrangement for purchasing capacity. However, in the instances that access to fiber capacity is being unreasonably withheld, the CPUC should intervene in such cases where such withholding is preventing a community from obtaining high-speed access. Unless a holder of fiber infrastructure is already in progress to extend its reach to that community, allowing for withholding of a crucial resource will drive up the costs of local solutions and ultimately stymie the state's effort to get all of its residents connected to 100 mbps Internet.

d. How should the Commission consider the role of communications in serving all households in a community and concerns about digital redlining?

Studies are showing that digital redlining in regards to fiber-optic deployment is happening at a systemic level in California's major cities. In both Oakland⁴⁶ and Los Angeles County,⁴⁷ in-depth analysis has found that low income neighborhoods, predominantly represented by communities of color, have been left behind in 21st-century infrastructure despite the clear legal prohibition on discrimination based on socioeconomic status.⁴⁸ As the CPUC's General Order

⁴⁵ Mimosa Networks, *Dillon Beach internet Lights up California Beach Town with Mimosa*, available at <https://mimosa.co/case-studies/dillon-beach-internet-lights-up-california-beach-town-with-mimosa>.

⁴⁶ Vincent Le and Gissela Moya, *On the Wrong Side of the Digital Divide: Life Without Internet Access, and Why We Must Fix It in the Age of COVID-19*, The Greenlining Institute (June 2, 2020), <https://greenlining.org/publications/online-resources/2020/on-the-wrong-side-of-the-digital-divide/>

⁴⁷ Galperin, H., Bar, F., Kim, A.M., Le, T.V., Daum, K., *Who Gets Access to Fast Broadband? Evidence from Los Angeles County*, Spatial Analysis Lab at USC Price, Annenberg School for Communication (Sept. 2019), <http://arnicusc.org/wp-content/uploads/2019/10/Policy-Brief-4-final.pdf>

⁴⁸ Digital Infrastructure and Video Competition Act (2006), Section 5810 (a). *See also* General Order 169, Implementing the Digital Infrastructure and Video Competition Act of 2006 (DIVCA), available at

implementing the obligations of franchise holders clearly states, an objective of the state is to “promote the widespread access to the most technologically advanced cable and video services to all California communities in a nondiscriminatory manner, regardless of their socioeconomic status.”⁴⁹ Fiber is the core ingredient to those advanced services.

Make no mistake. Communities that do not receive investments in fiber in their broadband access will not only miss out on the benefits of faster services, but over time, the costs of provisioning broadband to them will increase while failing to keep up with demand.⁵⁰ As applications and services continue to require more bandwidth, a community left with an underinvested legacy infrastructure will simply be unable to fully utilize the Internet. In effect, they will be left with second-class status as Internet users through the intentional deployment decisions of ISPs despite the clear wording of the law prohibiting this outcome.

A driving factor for digital redlining of fiber deployments stems from the 3 to 5 year return on investment formulas major ISPs have self-imposed. A longer 10 year return on investment formula radically changes the deployment plan of an ISP as evidenced by Frontier Communications bankruptcy filings,⁵¹ but the absence of regulation will drive them towards shorter time frames for their investors. Public policy prohibiting deployment based on socioeconomic status was explicitly designed around addressing artificially short term self-imposed profit formulas from dictating deployment plans.

There should be no doubt that major cities in California are completely profitable to serve **in their entirety** for large ISPs without government subsidy because they have sufficient density to generate profits at the aggregate level. In terms of population density, Los Angeles County has a density of 2,419 people per square mile⁵² while Oakland’s population is 7,004 people per square

https://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/Utilities_and_Industries/Communications_-_Telecommunications_and_Broadband/Service_Provider_Information/Video_Franchising/GO%20169.PDF.

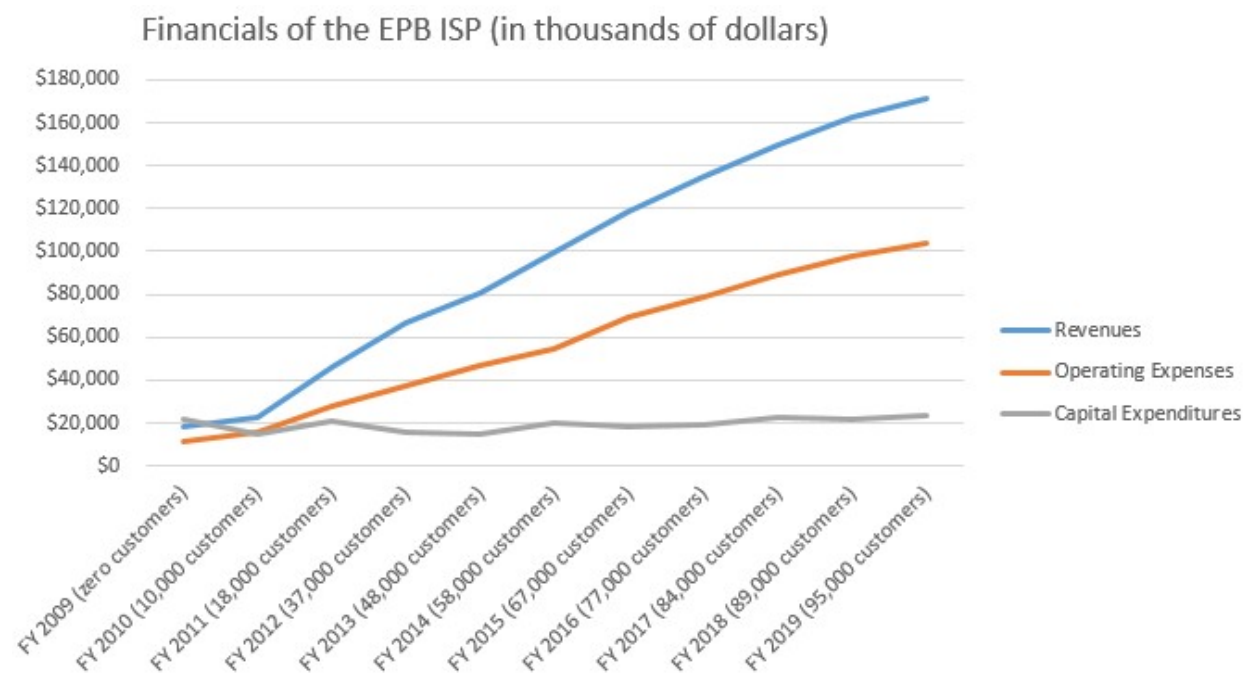
⁴⁹ *Id.*

⁵⁰ State of New Mexico Broadband Strategic Plan and Rural Broadband Assessment (2020) at page 89, available at <https://www.ctcnet.us/wp-content/uploads/2020/07/New-Mexico-Broadband-Strategic-Plan-20200616.pdf>.

⁵¹ Frontier Communications, *Presentation to Unsecured Bondholders* (Jan. 2020), available at https://www.sec.gov/Archives/edgar/data/20520/000114036120007104/nc10009883x2_ex99-1.htm.

⁵² UNITED STATES CENSUS, Los Angeles County, available at <https://www.census.gov/quickfacts/losangelescountycalifornia>.

mile.⁵³ By comparison, Lafayette⁵⁴ and Chattanooga⁵⁵ have half or less the population density, yet full deployment of FTTH that has revenue exceeding costs. Chattanooga in particular proves that only a fraction of the population is necessary to cover the costs of providing a FTTH to the community—revenues outpace the costs of adding new customers year after year (see chart below).



Moreover, a recent study of the cost of bandwidth and the prices consumers pay found that Los Angeles residents are pay nearly 300% more than Lafayette or Chattanooga⁵⁶ for their data needs. In essence, not only do major ISPs try to boost their profits by discriminating against low-income neighborhoods in violation of their franchise agreements with the CPUC, but they charge high-income neighborhoods more for high-speed access than they would in a more competitive climate. Those excess profits should be redirected towards updating the infrastructure in those low income neighborhoods as the law requires.

⁵³ UNITED STATES CENSUS, Oakland, available at <https://www.census.gov/quickfacts/oaklandcitycalifornia>.

⁵⁴ UNITED STATES CENSUS, Lafayette Parish, Louisiana, available at <https://www.census.gov/quickfacts/lafayetteparishlouisiana>.

⁵⁵ UNITED STATES CENSUS, Chattanooga city, Tennessee, available at <https://www.census.gov/quickfacts/chattanooga-citytennessee>.

⁵⁶ <https://www.newamerica.org/oti/reports/cost-connectivity-2020/>

VI. Strategies to Support Specific Communities and Uses.

- a. What further strategies, if any, should the Commission utilize to facilitate broadband Internet access service for low-income, high-threat, and/or low adoption communities, primary school students and institutions, libraries, and public safety communications?**

For major cities in California with a population density exceeding 1,000 people per square mile, full deployment of FTTH should already be commercially feasible. To the extent that the agreements through their statewide franchise explicitly prohibits discrimination based on socioeconomic status, the CPUC should investigate the fiber-optic deployment decisions of franchise holders to ensure that socioeconomic discrimination is not at the heart of their deployment decisions. To the extent a franchise holder has affirmatively declared publicly they do not intend to extend their fiber networks beyond their current footprint and they have not fully deployed fiber in the major cities they serve, the CPUC should presume such holder to be in violation of their franchise and take action. The absence of strong enforcement of the state's non-discrimination policy carries serious ramifications for low-income residents in major cities, as income status often can serve as a proxy for race.

EFF understands that local barriers might be part of the problem and is sympathetic to ISPs who are willing but unable to deploy. The CPUC should provide franchise holders who are unequally serving major cities an opportunity to justify their current status of deployment and assist in eliminating any regulatory barriers that may result in making otherwise economically feasible-to-serve households infeasible. Franchise holders can demonstrate barriers by detailing how a specific community's cost per household is significantly above a comparable market due to a local barrier. In exchange for CPUC intervention, a build out deadline should be attached to the regulatory benefit. However, should the CPUC determine that no meaningful barriers exist that prohibit an ISP from fully serving the entirety of a major city with fiber, then the ISP should be given a period of time to remedy the situation both in the short term and long term or risk losing their franchise license.

Such short-term remedies could include the provider opening up their fiber to Wireless Internet Service Providers for a 10-year period of time so that they can serve those communities quickly while fiber is rolled out in the following years. This also enables smaller providers the ability to generate revenue and finance their own fiber deployments. In the long term, a mandated deadline for reaching full fiber deployment not exceeding five years will be necessary in order to bring certainty to communities waiting for access and put the franchise holder on notice of their obligation with a reasonable period of time to comply.

If a franchise holder was already in process of actively deploying fiber, the CPUC should simply monitor their deployment progress for potential discrimination based on socio economic status in violation of their franchise. Undoubtedly the fear of losing access to the lucrative California market should be a sufficient motivation for a franchise holder to desist in economically discriminatory deployment strategies in city markets that are profitable to fully serve. EFF would note that rural markets pose a very different challenge due to a lack of density, but solutions to connect them to fiber exist outside of private industry regulation.

b. What are the strategies and models that public entities can pursue for communications infrastructure and what are the means through which the Commission can support them?

The end of Verizon's deployment of FIOS years ago, Google's entry into and exit from the broadband market with Google Fiber,⁵⁷ AT&T's discontinuation of its FTTH deployment now that the DirecTV mandate has been lifted,⁵⁸ and Frontier Communications bankruptcy all show that no large national corporation in the U.S. market will be the entity that delivers FTTH to all residents. In the instances that the private model for broadband deployment has shown its limits, the state should embrace already proven public models that are cropping up across the country. More than 230 communities are served with publicly owned gigabit networks today with more

⁵⁷ Brian Fung, *Why Google Fiber Stopped Its Plans to Expand to More Cities*, WASHINGTON POST, Oct. 26, 2016, available at <https://www.sacbee.com/news/nation-world/national/article110655177.html>.

⁵⁸ Jon Brodtkin, *AT&T cuts another 1,800 jobs as it finishes fiber-Internet buildout*, ARS TECHNICA (June 17, 2019), <https://arstechnica.com/tech-policy/2019/06/att-cuts-another-1800-jobs-as-it-finishes-fiber-internet-buildout>.

joining every day.⁵⁹ As noted earlier, it has been proven that even at 2.4 people per square mile FTTH is feasible leaving virtually no part of California ineligible for the public model.

Rural cooperatives in particular are proving exceedingly capable of tackling the hardest to serve communities while keeping costs at a fraction of a national telecom provider. To the extent California lacks rural cooperatives, the state should assist its rural communities in establishing special districts by providing financial support for feasibility studies, engineering support, educational resources, and long term infrastructure financing to help establish a local public option. The state can also serve as a type of convening force inviting many of the successful public entities across the country to share their knowledge and experience with local leaders in the state.

Fiber networks will serve these communities for an estimated 70 years or longer allowing for “mortgage” type financing and long term planning. Availability of long term 30 year financing with the right local public entity on the ground will be the means of reaching the final 99th percent of users with fiber. Eventually these networks will become self-sufficient both financially and operationally allowing for the state’s investment to be impactful but not perpetual. And most importantly of all, a strong embrace of local public options will bring about the end of the digital divide.

Respectfully submitted,

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/s/ Ernesto Falcon

Ernesto Falcon

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⁵⁹ Community Networks Map, available at <https://muninetworks.org/communitymap>.